5 The Auto Shop and Safety

After studying this chapter, you will be able to:

- Describe the typical layout and sections of an auto shop.
- List the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.
- Describe general safety rules for the auto shop.

An auto shop can be a safe and enjoyable place to work. Most shops are clean, well lighted, and relatively safe, **Figure 5-1.** However, if basic safety rules are *not* followed, an auto shop can be very dangerous. In this chapter, the layout of a typical automotive service facility will be discussed and the most important safety rules will be emphasized.

Auto Shop Layout

There are several different areas in an auto shop. You must know their names and the basic rules that apply to each. It is important that you learn your shop layout and organization to improve work efficiency and safety. The auto shop includes the following work areas:

- Repair area (includes the shop stall, lift, alignment rack, and outside work area).
- Toolroom.
- Classroom.
- Locker room (dressing room).

Figure 5-1. A well-maintained automotive shop can be an enjoyable place to work. Always do your part to keep the shop clean and well organized.

Repair Area

The ***repair area*** includes any location in the shop where repair operations are performed. It normally includes every area *except* the classroom, locker room, and toolroom.

Shop Stall

A ***shop stall*** is a small work area where a car can be parked for repairs. Sometimes, each stall is numbered and marked off with lines painted on the floor.

Lift

The ***lift*** is used to raise a vehicle into the air. Refer to **Figure 5-2.** It is handy for working under the car

Figure 5-2. A lift is handy for repairs on parts located under the vehicle. It is commonly used when changing oil, greasing the chassis, and repairing the exhaust system. (Eagle Equipment)

(draining oil, greasing front end parts, or repairing exhaust system).

Remember these ***lift safety rules:***

- Ask your instructor for a demonstration and get permission before using the lift.
- Center the vehicle on the lift as described in a service manual, **Figure 5-3.** Raise vehicle slowly.
- Check ceiling clearance before raising trucks and campers. Make sure the vehicle roof does not hit overhead pipes, lights, or the ceiling.
- Make sure the lift's safety catch is engaged. Do not walk under the lift without the catch locked into position, **Figure 5-4.**

Alignment Rack

The ***alignment rack,*** or ***front end rack,*** is another specialized stall used when working on a car's steering and suspension systems. One is shown in **Figure 5-5.** It may contain a special tool board and equipment used when replacing worn suspension and steering parts or adjusting wheel alignment.

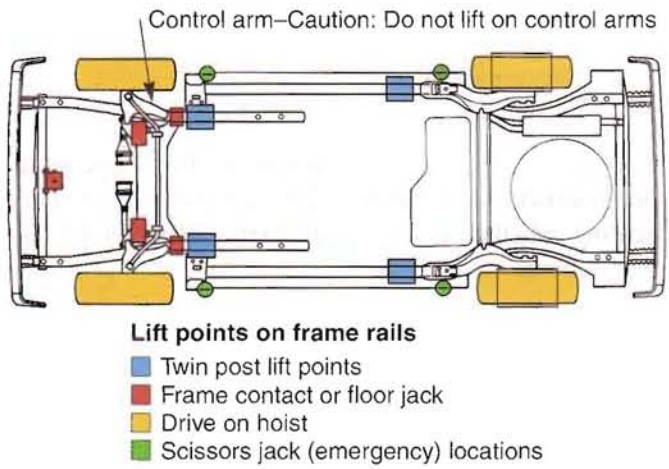

Control arm–Caution: Do not lift on control arms
Lift points on frame rails
Twin post lift points
Frame contact or floor jack
Drive on hoist
Scissors jack (emergency) locations

Figure 5-3. Follow the service manual instructions when raising a car on a lift. Note the specific lifting instructions and lift points for this vehicle. (DaimlerChrysler)

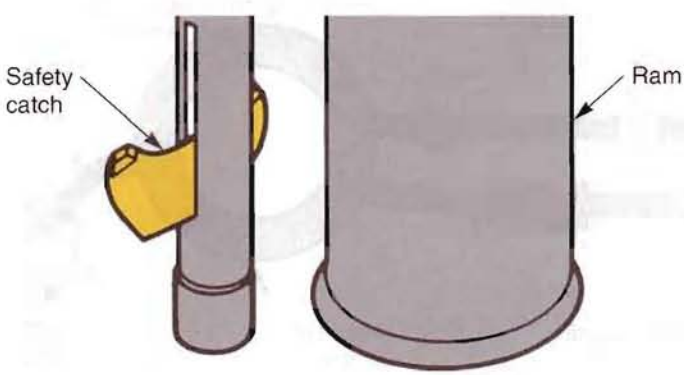


Figure 5-4. Most lifts have a safety catch. It must be engaged before working under the vehicle. (Ford)

Figure 5-5. An alignment rack is used in most shops. It is often needed when servicing steering and suspension systems. (Hunter)

When using an alignment rack, the car should be pulled onto the rack slowly and carefully. Someone should *guide* the driver and help keep the tires centered on the rack. As with other complicated and potentially dangerous equipment, obtain a full demonstration before using the alignment rack.

Outside Work Area

Some auto shop facilities have an ***outside work area*** adjacent to the garage overhead doors. In good weather, this area can be used for auto repairs.

Always raise the shop doors all the way and pull cars through the doors very slowly. Check the height of trucks and campers to make sure they will clear (top of vehicle will not hit doors).

Toolroom

The ***toolroom*** is used to store shop tools, small equipment, and supplies (nuts, bolts, oil, etc.). It is normally located adjacent to (next to) the repair area or classroom.

When working in the toolroom, you will be responsible for keeping track of shop tools. Every tool checked out of the toolroom must be recorded and called in before the end of the class period.

Normally, the tools hang on the walls of the toolroom for easy access. Each tool may have a painted silhouette, which indicates where it should be kept, **Figure 5-6.** Your instructor will detail specific toolroom policies and procedures.

Classroom

The ***classroom*** is used for seminars, demonstrations, and other technician training activities. It is often located adjacent to the repair area.

Figure 5-6. Keep all shop tools clean and organized. Make sure you return every tool to its correct location.

Locker Room

The ***locker room*** or ***dressing room*** provides an area for changing into your work clothes. It is usually located adjacent to the main shop.

Shop Safety

Every year, thousands of technicians are accidentally injured or killed on the job. Most of these accidents resulted from a broken safety rule. The injured persons learned to respect safety rules the hard way—by experiencing a painful injury. You must learn to respect safety rules the easy way—by studying and following the safety rules given in this book.

Note!
Specific safety rules on hand tools, power tools, shop equipment, and special operations are given elsewhere in this text. It is much easier to understand and remember these rules when they are covered fully.

While working, constantly think of safety. Look for unsafe work habits, unsafe equipment, and other potentials for accidents. See **Figure 5-7.**

When working in an auto shop, you must always remember that you are surrounded by other technicians. This makes it even more important that you concentrate on safety to prevent injury to yourself and to others in the shop.

Types of Accidents

Basically, you should be aware of and try to prevent six kinds of accidents:

- Fires.
- Explosions.
- Asphyxiation (airborne poisons).
- Chemical burns.
- Electric shock.
- Physical injuries.

If an accident or injury occurs in the shop, notify your instructor immediately. Use common sense when deciding whether to get a fire extinguisher or to take other actions.

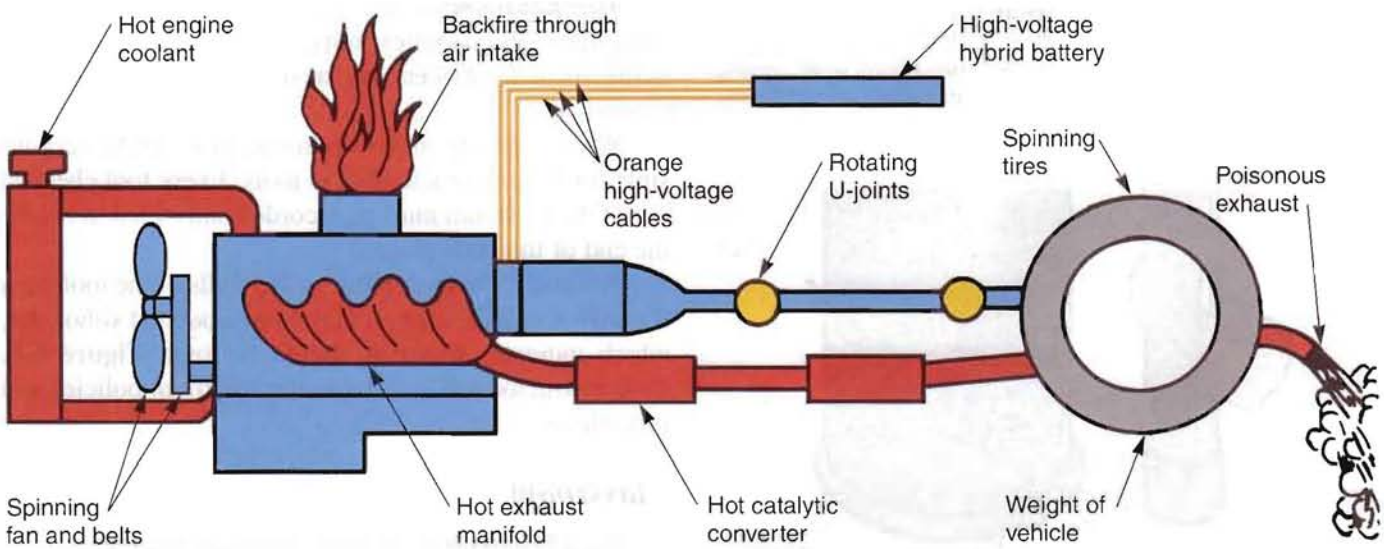


Figure 5-7. An automotive shop has the potential to be very dangerous. Just a few of the dangers present around an automobile are shown.

Fires

Fires are terrible accidents capable of causing severe injury and permanent scar tissue. Therefore, every precaution must be taken to prevent fires in the automotive shop.

There are numerous combustible substances (gasoline, oily rags, paints, thinners) found in an auto shop. ***Gasoline*** is by far the most dangerous and underestimated flammable in an auto shop. Gasoline has astonishing potential for causing a tremendous fire. Just a cupful of gasoline can instantly engulf a car in flames.

A few gasoline safety rules include:

- Store gasoline and other flammables in approved, sealed containers.
- When disconnecting a vehicle's fuel line or hose, wrap a shop rag around the fitting to keep fuel from squirting or leaking.
- Disconnect the battery before working on a fuel system.
- Wipe up gasoline spills immediately. Do not place oil absorbent (oil-dry) on gasoline because the absorbent will become highly flammable.
- Keep any source of heat away from fuel system parts.
- Never use gasoline as a cleaning solvent.

Oily rags can also start fires. Soiled rags should be stored in an approved safety can (can with lid).

Paints, thinners, and other combustible materials should be stored in a fire cabinet. Also, never set flammables near a source of sparks (grinder), flames (welder or water heater), or heat (furnace for example).

Electrical fires can result when a "hot wire" (wire carrying current to component) touches ground (vehicle frame or body). The wire can heat up, melt the insulation, and burn. Then, other wires can do the same. Dozens of wires could burn up in a matter of seconds.

To prevent electrical fires, always disconnect the battery when told to do so in a service manual. If possible, keep the battery disconnected during repairs.

Locate the ***fire extinguishers*** in your shop and learn how to use them before they are needed. The few seconds spent learning how to operate a fire extinguisher could be the difference between life and death during a fire.

Figure 5-8 shows various fire classifications and fire extinguisher types. Always use the recommended type of extinguisher. Using the wrong extinguisher can actually cause the flames to spread. Multipurpose fire extinguishers can be used for a variety of fires. The most common type of multipurpose extinguisher is an A, B, C, dry-chemical fire extinguisher.

To use a fire extinguisher, pull the safety pin from the handle. Aim the nozzle at the flames as outlined in **Figure 5-8** and squeeze the extinguisher handle.

Explosions

An ***explosion*** is the rapid, almost instant, combustion of a material that causes a powerful shock wave to travel through the shop. Several types of explosions are possible in an auto repair facility. You should be aware of these sources of sudden death and injury.

Hydrogen gas can surround the top of a car battery that is being charged or discharged (used). This gas is highly explosive. The slightest spark or flame can ignite the hydrogen gas, causing the battery to explode. Battery acid and pieces of the battery case can blow into your eyes and face. Blindness, facial cuts, acid burns, and scars can result. Always wear eye and face protection when working around a battery. See **Figure 5-9.**

Fuel tanks can explode, even seemingly empty ones. A drained fuel tank can still contain fuel gum and varnish. When this gum is heated and melts, it can emit vapors that may ignite.

Keep sparks and heat away from fuel tanks. When a fuel tank explodes, one side will usually blow out. Then, the tank will shoot across the shop as if shot out of a cannon. You or other workers could be killed or seriously injured.

Various other sources can cause shop explosions. For example, special sodium-filled engine valves, welding tanks, and propane-filled bottles can explode if mishandled. These hazards will be discussed in later chapters.

Warning!
Air bags should be handled with extreme care. If accidentally deployed, they can break bones or even kill. Carry them with the metal housing facing downward and away from your body. Keep all sources of electricity away from undeployed air bags.

Asphyxiation

Asphyxiation is caused by breathing toxic or poisonous substances. Mild cases of asphyxiation will cause dizziness, headaches, and vomiting. Severe asphyxiation can cause death.

The most common cause of asphyxiation in an auto shop is the exhaust gases produced by an automobile engine. *Exhaust gases are poison.* If a vehicle must be operated in an enclosed shop, connect the vehicle's tailpipe to the shop's exhaust ventilation system as shown in **Figure 5-10.** Also, make sure the exhaust ventilation system is turned *on.*

Fire Extinguishers and Fire Classifications

Fires	Type	Use	Operation
Class A Fires Ordinary Combustibles (Materials such as wood, paper, textiles.) *Requires... cooling-quenching.* Old: A New:	**Soda-acid** Bicarbonate of soda solution and sulfuric acid 	Okay for use on: A Not for use on: B C D	Direct stream at base of flame.
Class B Fires Flammable Liquids (Liquids such as grease, gasoline, oils, and paints.) *Requires...blanketing or smothering.* Old: B New:	**Pressurized Water** Water under pressure 	Okay for use on: A Not for use on: B C D	Direct stream at base of flame.
Class C Fires Electrical Equipment (Motors, switches, and so forth.) *Requires... a nonconducting agent.* Old: C New:	**Carbon Dioxide (CO_2)** Carbon dioxide (CO_2) gas under pressure 	Okay for use on: B C Not for use on: A D	Direct discharge as close to fire as possible, first at edge of flames and gradually forward and upward.
Class D Fires Combustible Metals (Flammable metals such as magnesium and lithium.) *Requires...blanketing or smothering.* D	**Foam** Solution of aluminum sulfate and bicarbonate of soda 	Okay for use on: A B Not for use on: C D	Direct stream into the burning material or liquid. Allow foam to fall lightly on fire.
	Dry Chemical 	Multi-purpose type: Okay for A B C; Not okay for D Ordinary BC type: Okay for B C; Not okay for A D	Direct stream at base of flames. Use rapid left-to-right motion toward flames.
	Dry Chemical Granular type material	Okay for use on: D Not for use on: A B C	Smother flames by scooping granular material from bucket onto burning metal.

Figure 5-8. There are several different types of fires. Fire extinguishers are rated by the type of fire on which they should be used.

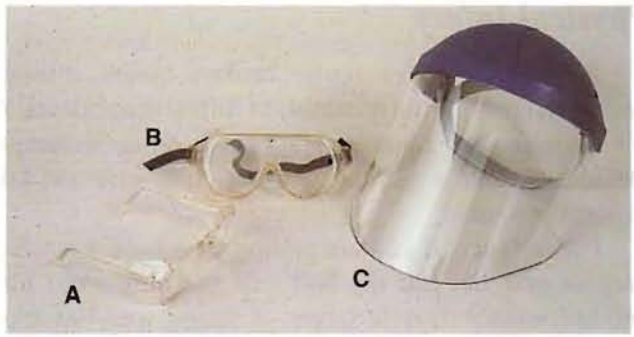


Figure 5-9. Wear approved eye and face protection when needed. A—Safety glasses. B—Safety goggles. C—Face shield.

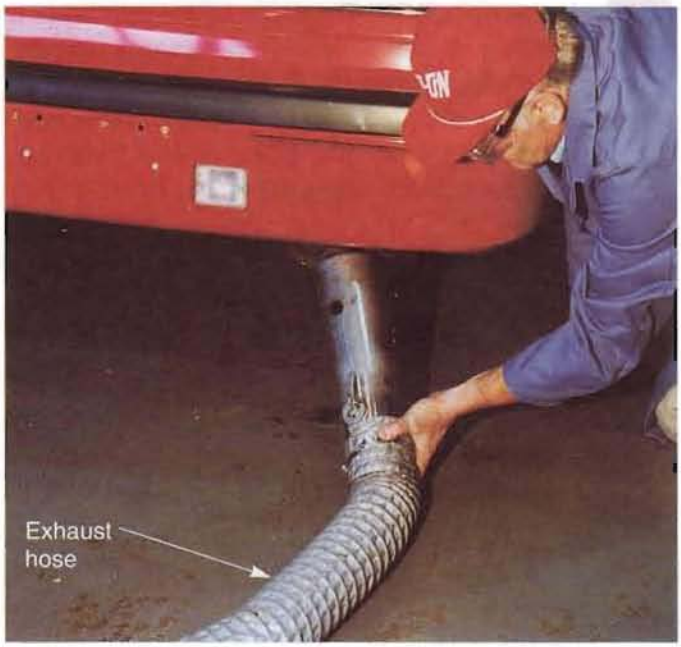


Figure 5-10. Place an exhaust hose over the tailpipe of any car running in an enclosed shop. This will prevent the shop from filling with deadly fumes. (Kent-Moore)

Discussed in related chapters, other shop substances are harmful if inhaled. A few of these harmful substances include asbestos (brake lining dust, clutch disc dust), parts cleaners, and paint spray. ***Respirators*** (filter masks) should be worn when working around any airborne impurities. Refer to **Figure 5-11.**

Chemical Burns

Solvents (parts cleaners), battery acid, and various other corrosive shop substances can cause ***chemical burns*** to the skin. Always read the directions on all chemical containers. Also, be sure to wear proper protective gear when handling solvents and other caustic materials. See **Figure 5-12.**

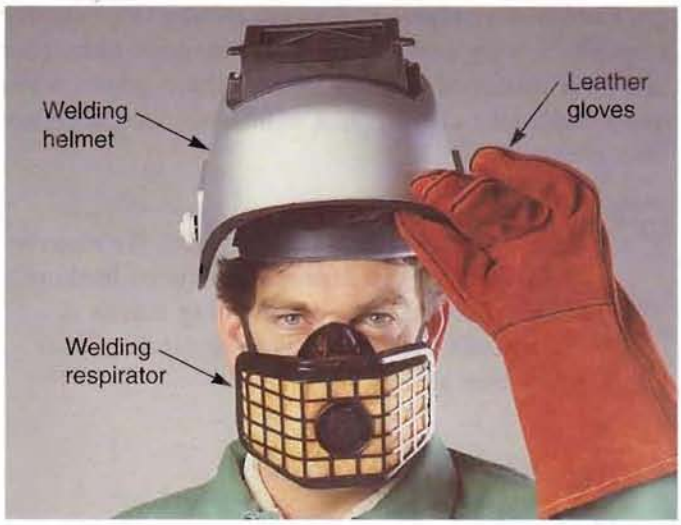


Figure 5-11. This technician is wearing a welding respirator to protect himself from toxic welding fumes. The welding helmet will shield the technician's face and eyes from hot sparks and the bright, "blinding" welding arc. (Lab Safety)

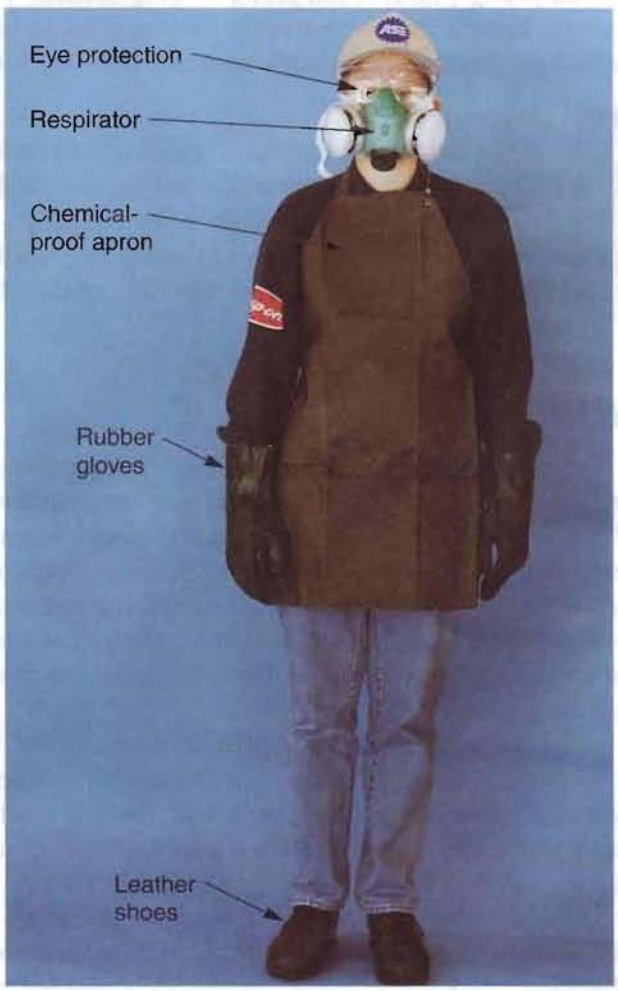


Figure 5-12 Always dress properly when handling substances that can cause chemical burns. Note that this technician is wearing rubber gloves, a chemical-proof apron, a respirator, and safety goggles.

Carburetor cleaner (decarbonizing types), for example, is very powerful and can severely burn your skin in a matter of seconds. Wear rubber gloves when using carburetor cleaner. If a skin burn occurs, follow label directions.

Warning!
If your eyes are chemically burned, the material safety warning label may recommend flushing them with water. An ***eye flushing station*** is sometimes used to wash chemicals from your eyes after an accident.

Electric Shock

Electric shock is a result of electric current passing through parts of your body, causing injury or death. It can occur when using improperly grounded electric power tools.

Never use an electric tool unless it has a functional ***ground prong*** (third, round prong on plug socket). This prevents current from accidentally passing through your body. Also, never use an electric tool on a wet shop floor.

Warning!
Some late-model cars have heated windshields. The alternators on these vehicles are designed to put out more than 100 volts ac to quickly warm the windshield. This is enough voltage to cause electric shock. Work carefully around this high voltage.

Hybrid Safety

Hybrid vehicles use a high-voltage motor-generator and a battery pack that operates on approximately 300–600 volts. This is enough electrical energy to cause serious injury or even electrocution! Voltage levels and hybrid service procedures vary. Therefore, it is important to follow the vehicle manufacturer's instructions and safety rules when working on a specific make and model hybrid.

Always wear rubber electrician's gloves (rated for 1000 volts) when working on a high-voltage hybrid drive system. The thick rubber gloves will prevent electric shock if you accidentally touch a conductor carrying high voltage and current.

Most hybrids have a ***main power cutoff switch,*** or "kill switch," near the output cables of the battery pack. This switch allows you to electrically disconnect the battery pack from the rest of the hybrid drive system. It should be turned to the off position before servicing a hybrid drive system.

Physical Injury

Physical injuries (cuts, broken bones, strained backs) can result from hundreds of different accidents. As a technician, you must evaluate every repair technique. Decide whether a particular operation is safe and take action as required.

For instance, if you are pulling on a hand wrench as hard as you can and the bolt will not turn, *stop!* Find another wrench that is larger. A larger tool has more leverage and is, therefore, safer. This approach will help prevent injuries and improve your mechanical abilities.

Warning!
Never overexert your back by improperly lifting heavy assemblies. Once you injure your back, it can take months to recover. Sometimes, surgery is needed to repair the damage. When lifting a heavy object, keep your back straight. Bend your knees and lift the item with your legs. If necessary, use power equipment to move heavy objects.

General Safety Rules

Listed are several general safety rules that should be followed at all times.

- Wear eye protection during any operation that could endanger your eyes. This would include operating power tools, working around a running car engine, carrying batteries, etc.
- Avoid anyone who does not take shop work seriously. Remember, a joker is "an accident just waiting to happen."
- Keep your shop organized. Return all tools and equipment to their proper storage areas. Never lay tools, creepers, or parts on the floor.
- Dress in an appropriate manner. Never wear loose clothing, neckties, shorts, or open-toed shoes when working in the shop. Remove rings, bracelets, necklaces, watches, and other jewelry. They can get caught in engine fans, belts, drive shafts, and other rotating parts, causing serious injury. Also, button or roll up long sleeves and secure long hair; they too can get caught in spinning parts.
- Never carry sharp tools or parts in your pockets. They can puncture the skin.
- Wear full face protection when grinding, welding, and performing other operations where severe hazards are present.
- Work like a professional. When learning auto repair, it is easy to get excited about your work.

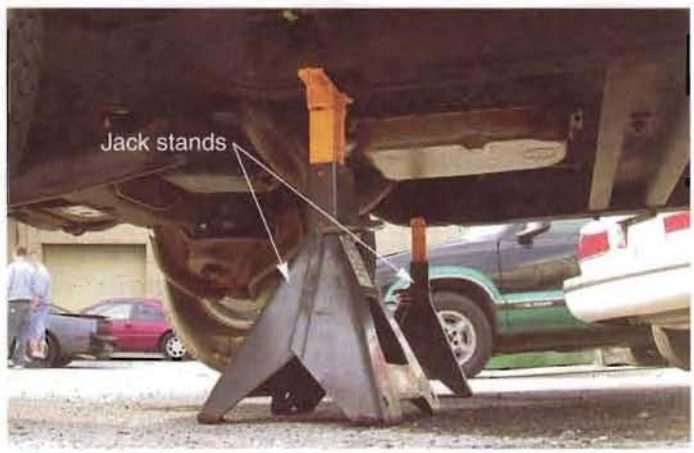
However, avoid working too fast. You could overlook a repair procedure or safety rule.

- Use the right tool for the job. There is usually a "best tool" for each repair task. Always be thinking about whether a different tool will work better than another, especially when you run into difficulty.
- Keep guards or shields in place. If a power tool has a safety guard, use it.
- Lift with your legs, not your back. There are many assemblies that are very heavy. When lifting, bend at your knees while keeping your back straight. On extremely heavy assemblies (transmissions, engine blocks, rear axles, transaxles), use a portable crane.
- Use adequate lighting. A portable shop light not only increases working safety, but it increases working speed and precision.
- Ventilate when needed. Turn on the shop ventilation fan anytime fumes are present in the shop.
- Never stir up asbestos dust. Asbestos dust (particles found in brake and clutch assemblies) is a powerful *cancer-causing agent.* Do *not* use compressed air to blow the dust from brake and clutch parts. Use an enclosed vacuum system to remove asbestos dust from brake assemblies.
- Jack up a vehicle slowly and safely. A car can weigh between one and two tons. Never work under a vehicle not supported by jack stands. It is *not* safe to work under a vehicle supported by only a floor jack. See **Figure 5-13.**
- Drive slowly when in the shop area. With all the other students and vehicles in the shop, it is very easy to have an accident.
- Report unsafe conditions to your instructor. If you notice any type of hazard, let your instructor know about it.
- Stay away from engine fans. The fan on an engine is like a spinning knife. It can inflict serious injuries. Also, if a part or tool is dropped into the fan, it can fly out and hit someone. Electric fans can turn on even with the ignition key off!
- Respect running engines. When an engine is running, make sure the transmission is in park or neutral, the emergency brake is set, and the wheels are blocked. If these steps are not taken and the car is accidentally knocked into gear, it could run over you or a friend.
- Do not smoke in the auto shop. Smoking is a serious fire hazard, considering fuel lines, cleaning solvents, paints, and other flammables may be exposed.
- Read material safety data sheets when in doubt about any dangers. The material safety data sheet contains all the information needed to work safely with the hazardous material. See **Figure 5-14.**
- Obtain instructor permission before using any new or unfamiliar power tool, lift, or other shop equipment. If necessary, your instructor will give a demonstration.

Customer Relations

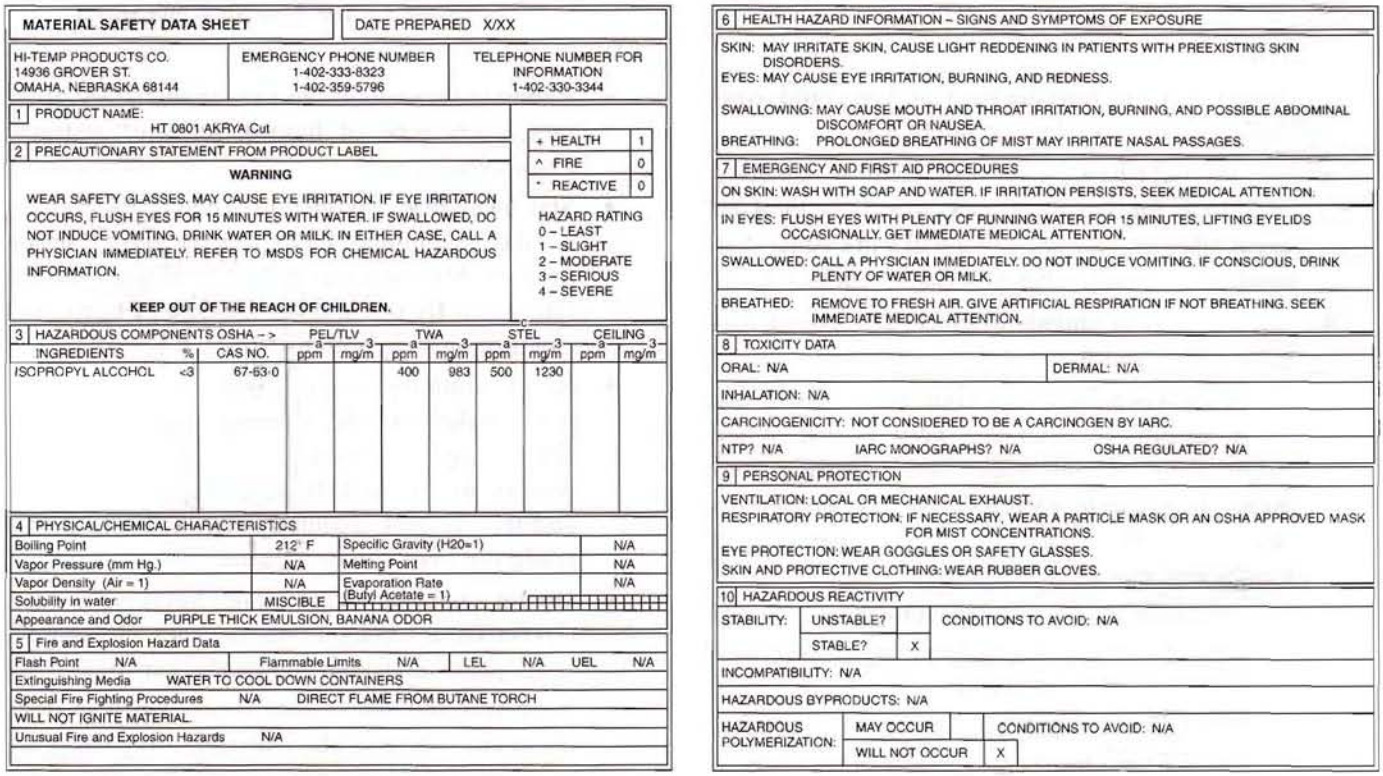
Most shop insurance policies do not cover customers who enter the shop work area. When informing customers that they are not allowed in the repair area, explain that the insurance company, not the shop, has made this rule. This will help prevent the customer from being offended by being told to leave the work area.

A



B

Figure 5-13. Never work under a car supported only by a floor jack. A—A jack must only be used for initial lifting. B—Jack stands are used to secure the car before working under it. Place the stands under the recommended lift points.



MATERIAL SAFETY DATA SHEET | DATE PREPARED X/XX

HI-TEMP PRODUCTS CO.
14936 GROVER ST.
OMAHA, NEBRASKA 68144

EMERGENCY PHONE NUMBER
1-402-333-8323
1-402-359-5796

TELEPHONE NUMBER FOR INFORMATION
1-402-330-3344

1 PRODUCT NAME:
HT 0801 AKRYA Cut

+ HEALTH	1
^ FIRE	0
* REACTIVE	0

2 PRECAUTIONARY STATEMENT FROM PRODUCT LABEL

WARNING

WEAR SAFETY GLASSES. MAY CAUSE EYE IRRITATION. IF EYE IRRITATION OCCURS, FLUSH EYES FOR 15 MINUTES WITH WATER. IF SWALLOWED, DO NOT INDUCE VOMITING. DRINK WATER OR MILK. IN EITHER CASE, CALL A PHYSICIAN IMMEDIATELY. REFER TO MSDS FOR CHEMICAL HAZARDOUS INFORMATION.

KEEP OUT OF THE REACH OF CHILDREN.

HAZARD RATING
0 – LEAST
1 – SLIGHT
2 – MODERATE
3 – SERIOUS
4 – SEVERE

3 HAZARDOUS COMPONENTS OSHA –>

INGREDIENTS	%	CAS NO.	PEL/TLV ppm a	PEL/TLV mg/m3 a	TWA ppm a	TWA mg/m3 a	STEL ppm a	STEL mg/m3 a	CEILING ppm a	CEILING mg/m3 a
ISOPROPYL ALCOHOL	<3	67-63-0			400	983	500	1230		

4 PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	212° F	Specific Gravity (H20=1)	N/A
Vapor Pressure (mm Hg.)	N/A	Melting Point	N/A
Vapor Density (Air = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in water	MISCIBLE		
Appearance and Odor	PURPLE THICK EMULSION, BANANA ODOR		

5 Fire and Explosion Hazard Data

Flash Point	N/A	Flammable Limits	N/A	LEL N/A	UEL N/A
Extinguishing Media	WATER TO COOL DOWN CONTAINERS				
Special Fire Fighting Procedures	N/A	DIRECT FLAME FROM BUTANE TORCH WILL NOT IGNITE MATERIAL.			
Unusual Fire and Explosion Hazards	N/A				

6 HEALTH HAZARD INFORMATION – SIGNS AND SYMPTOMS OF EXPOSURE

SKIN: MAY IRRITATE SKIN, CAUSE LIGHT REDDENING IN PATIENTS WITH PREEXISTING SKIN DISORDERS.
EYES: MAY CAUSE EYE IRRITATION, BURNING, AND REDNESS.
SWALLOWING: MAY CAUSE MOUTH AND THROAT IRRITATION, BURNING, AND POSSIBLE ABDOMINAL DISCOMFORT OR NAUSEA.
BREATHING: PROLONGED BREATHING OF MIST MAY IRRITATE NASAL PASSAGES.

7 EMERGENCY AND FIRST AID PROCEDURES

ON SKIN: WASH WITH SOAP AND WATER. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION.
IN EYES: FLUSH EYES WITH PLENTY OF RUNNING WATER FOR 15 MINUTES, LIFTING EYELIDS OCCASIONALLY. GET IMMEDIATE MEDICAL ATTENTION.
SWALLOWED: CALL A PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING. IF CONSCIOUS, DRINK PLENTY OF WATER OR MILK.
BREATHED: REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. SEEK IMMEDIATE MEDICAL ATTENTION.

8 TOXICITY DATA

ORAL: N/A | DERMAL: N/A
INHALATION: N/A
CARCINOGENICITY: NOT CONSIDERED TO BE A CARCINOGEN BY IARC.
NTP? N/A IARC MONOGRAPHS? N/A OSHA REGULATED? N/A

9 PERSONAL PROTECTION

VENTILATION: LOCAL OR MECHANICAL EXHAUST.
RESPIRATORY PROTECTION: IF NECESSARY, WEAR A PARTICLE MASK OR AN OSHA APPROVED MASK FOR MIST CONCENTRATIONS.
EYE PROTECTION: WEAR GOGGLES OR SAFETY GLASSES.
SKIN AND PROTECTIVE CLOTHING: WEAR RUBBER GLOVES.

10 HAZARDOUS REACTIVITY

STABILITY:	UNSTABLE?		CONDITIONS TO AVOID: N/A
	STABLE?	X	
INCOMPATIBILITY: N/A			
HAZARDOUS BYPRODUCTS: N/A			
HAZARDOUS POLYMERIZATION:	MAY OCCUR		CONDITIONS TO AVOID: N/A
	WILL NOT OCCUR	X	

Figure 5-14. Study the types of information given on a material safety data sheet. (Hi-Temp Products Co.)

Summary

- An auto shop can be a very safe and enjoyable place to work. However, if basic safety rules are *not* followed, an auto shop can be very dangerous.
- The shop repair area includes any location in the shop where repair operations are performed.
- The toolroom is a shop area normally adjacent (next to) the main shop or classroom. It is used to store shop tools, small equipment, and supplies (nuts, bolts, oil).
- Every year, thousands of technicians are injured or killed on the job. Most of these accidents resulted from a broken safety rule.
- Fires are capable of causing instant and permanent scar tissue. There are numerous combustible substances found in an auto shop.
- Gasoline is by far the most dangerous and often underestimated flammable in an auto shop.
- Electrical fires can result when a "hot wire" (wire carrying current to component) touches ground (vehicle frame or body).
- An explosion is the rapid combustion of a material, which causes a powerful shock wave to travel out through the shop.
- Asphyxiation is caused by breathing toxic or poisonous substances in the air.
- Respirators should be worn when working around any kind of airborne impurities.
- Electric shock results when electric current passes through your body, causing injury or death.
- Physical injuries (cuts, broken bones, strained backs) can result from a variety of accidents.

Important Terms

Repair area
Shop stall
Lift
Alignment rack
Toolroom
Outside work area
Locker room
Dressing room
Fires
Fire extinguishers
Explosion
Asphyxiation
Respirators
Chemical burns
Eye flushing station
Electric shock
Ground prong
Physical injuries

Review Questions—Chapter 5

Please do not write in this text. Place your answers on a separate sheet of paper.

1. List four safety rules to follow when using a vehicle lift.
2. A(n) _____ _____ is used when working on a car's steering and suspension systems. It has special equipment for aligning the vehicle's wheels.

3. _____ is the most common and dangerous flammable found in an auto shop.
4. What causes an electrical fire in an automobile?
5. Car batteries can explode. True or False?
6. Which of the following cannot cause electric shock?
   (A) A missing ground prong on cord.
   (B) Using an electric drill on wet floor.
   (C) Using electric tools with a ground prong.
   (D) None of the above.
7. Explain what must be done to prevent physical injuries.
8. If you are pulling on a wrench as hard as you can and the fastener does *not* turn, what should you do to prevent injury?
9. When lifting heavy objects, always lift with your _____.
   (A) arms
   (B) legs
   (C) back
   (D) None of the above.
10. List 20 general safety rules.

ASE-Type Questions

1. In which auto shop area would an exhaust system repair most likely be done?
   (A) Shop stall.
   (B) Grease rack.
   (C) Alignment rack.
   (D) Outside work area.
2. Rules to remember when using gasoline include each of the following *except:*
   (A) store gas in approved containers.
   (B) keep gas away from sources of heat.
   (C) use quick dry to absorb any gas spills.
   (D) never use gasoline as a cleaning solvent.
3. Which of the following is a possible source of explosions in an auto shop?
   (A) Fuel tanks.
   (B) Car batteries.
   (C) Welding tanks.
   (D) All of the above.
4. Asphyxiation can be caused by:
   (A) touching a current-carrying wire.
   (B) improper lifting techniques.
   (C) breathing toxic substances.
   (D) None of the above.
5. Asbestos dust, which can cause cancer, is found in:
   (A) fuel tanks.
   (B) transmissions.
   (C) propane-filled bottles.
   (D) brake and clutch assemblies.
6. A respirator is a:
   (A) filter mask.
   (B) type of chemical burn.
   (C) machine guard.
   (D) device to put out small fires.
7. Eye protection should be worn when:
   (A) carrying batteries.
   (B) operating power tools.
   (C) working by a running engine.
   (D) All of the above.
8. Which of the following is *not* a good tip when dressing for work?
   (A) Secure long hair.
   (B) Roll up long shirt sleeves.
   (C) Make sure all jewelry fits well.
   (D) Do not carry sharp tools in pocket.
9. An engine needs to be moved. Technician A says two people can slide the engine out of the way. Technician B says that an engine crane should be used to move the engine. Who is right?
   (A) A only.
   (B) B only.
   (C) Both A and B.
   (D) Neither A nor B.
10. When removing asbestos dust from parts, Technician A believes a vacuum system should be used. Technician B believes dust should be blown away using compressed air. Who is right?
   (A) A only.
   (B) B only.
   (C) Both A and B.
   (D) Neither A nor B.

Activities for Chapter 5

1. Sketch out a floor plan of your shop and label the different areas. Study the safety cautions in this chapter and determine if there are any safety hazards. Mark their location on the floor plan.
2. On the same floor plan, mark the location of fire extinguishers, exits, and water fountains.
3. Examine a fire extinguisher in the shop area; read the instructions carefully. Demonstrate its use.